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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* JIAWEN DONG, CHRISTOPHER GOEWY,  
BRUCE HARPER, EUGENE DAVID HERRMANN  
ROBERT JOHN HOSSAN, and MATT NIEMEYER

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Appeal 2009-006968  
Application 10/648,540  
Technology Center 1700

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Decided: November 10, 2009

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Before BRADLEY R. GARRIS, CHARLES F. WARREN, and  
TERRY J. OWENS, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL  
STATEMENT OF THE CASE

The Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1, 3-6, 8, 10-21, 23, 24, and 27-32, which are all of the pending claims. We have jurisdiction under 35 U.S.C. § 6(b).

### *The Invention*

The Appellants claim a method for molding a disk, and claim a disk made by the method. Claim 1 is illustrative:

1. A method of molding a disk, comprising injection molding a polymeric material at a melt temperature of about 330 to about 370°C into a mold having a mold temperature of about 90 to about 130°C and a clamp tonnage of about 12 to about 35 tons to form a disk;

wherein the polymeric material comprises poly(arylene ether) and poly(alkenyl aromatic);

wherein the disk exhibits a percent feature replication of greater than or equal to about 90 percent; and

wherein a disk assembly fabricated from the disk exhibits a radial tilt change value after 96 hours at 80°C of less than or equal to about 0.35 degree measured at a radius of 55 millimeters.

### *The References*

Allen	4,727,093	Feb. 23, 1988
Bopp	5,145,877	Sep. 8, 1992
Ohkawa	5,525,645	Jun. 11, 1996
Cheung	5,872,201	Feb. 16, 1999
Fortuyn	6,306,953 B1	Oct. 23, 2001
Davis	2002/0048691 A1	Apr. 25, 2002
Singh	6,407,200 B1	Jun. 18, 2002
Adedeji	2002/0137840 A1	Sep. 26, 2002
Tomita (Toshihiko) <sup>1</sup>	JP 10-306268	Nov. 17, 1998

Rosato et al., *Injection Molding Handbook* 60, 77-78, 179-180, 260-261, 283 (Kluwer, 3<sup>rd</sup> ed. 2000).

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<sup>1</sup> Both the Examiner (Ans. 3) and the Appellants (Br. 6) refer to the Tomita reference by Tomita's first name (Toshihiko). For consistency, we likewise do so. Citations herein to Toshihiko are to the English translation thereof which is of record.

*The Rejections*

The claims stand rejected under 35 U.S.C. § 103 as follows: claims 1, 3-6, 8, and 15-17 over Davis in view of Rosato, Toshihiko, and Bopp;<sup>2</sup> claims 18-21, 23, 24, 31, and 32 over Davis in view of Rosato, Toshihiko, Bopp and Ohkawa; claims 10 and 14 over Davis in view of Rosato, Toshihiko, Bopp, and Adedeji; claim 11 over Davis in view of Rosato, Toshihiko, Bopp, and Fortuyn; claim 12 over Davis in view of Rosato, Toshihiko, Bopp, and Allen; claim 13 over Davis in view of Rosato, Toshihiko, Bopp, and Cheung; claim 27 over Davis in view of Rosato, Toshihiko, Bopp, Ohkawa, and Singh; claim 28 over Davis in view of Rosato, Toshihiko, Bopp, Ohkawa, and Fortuyn; claim 29 over Davis in view of Rosato, Toshihiko, Bopp, Ohkawa, and Allen; and claim 30 over Davis in view of Rosato, Toshihiko, Bopp, Ohkawa, and Adedeji.

OPINION

We reverse the Examiner's rejections.

*Rejections of claims 1, 3-6, 8, and 10-17*

*Issue*

Have the Appellants shown reversible error in the Examiner's determination that it would have been prima facie obvious to one of ordinary skill in the art to injection mold a disk from a polymeric material comprising poly(arylene ether) and poly(alkenyl aromatic) at a melt temperature of

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<sup>2</sup> The Examiner omits claim 8 from the statement of the rejection over Davis in view of Rosato, Toshihiko, and Bopp (Ans. 3), and omits claim 21 from the rejection over Davis in view of Rosato, Toshihiko, Bopp, and Ohkawa (Ans. 6). Because the Examiner addresses those claims with respect to those rejections (Ans. 5, 8), we consider those omissions to be inadvertent and we consider those claims to be included in the respective rejections.

about 330 to about 370°C and a mold temperature of about 90 to about 130°C such that a disk assembly fabricated from the disk exhibits a radial tilt change value after 96 hours at 80°C of less than or equal to about 0.35 degree measured at a radius of 55 millimeters?

*Findings of Fact*

Davis discloses a data storage medium having a substrate with a maximum radial tilt of about 1° or less, more preferably about 0.3°, measured in a resting (non-spinning) state (¶ 0031). The substrate can be made of any plastic or plastic mixture capable of withstanding subsequent processing conditions (¶¶ 0052, 0054). The exemplified plastics include polystyrenes and polyphenylene ethers (¶ 0054). Davis discloses that the data storage medium can be made by injection molding, but Davis does not disclose injection molding parameters (¶¶ 0057-58). The surface features of the data storage medium have greater than about 90% replication of an original master (¶ 0120).

Rosato discloses that injection molding machine clamping forces range from less than 20 tons to thousands of tons, the clamping force being 100 to 400 tons for the average machine and thousands of tons for machines that mold large products (p. 60). The exemplified clamping forces include 25-35 tons for a Kurto/John machine (Table 2-3). Rosato discloses injection molding average melt and mold temperatures of, respectively, 100 and 45°C for polystyrene and 120 and 80°C for polyphenylene oxide (Table 4-8).

Toshihiko prepares an optical disk by forming, on one side of each of two transparent substrates (2a, 2b), an optical recording layer (3a, 3b) and then a transparent protective layer (4a, 4b), placing an adhesive sheet (5) between the transparent protective layers, and then pressing the assembly

together (¶¶ 0037-38; Fig. 1). Toshihiko discloses that because of the particular acrylic copolymer adhesive composition used, the optical disk has a radial tilt change value of 0.5° or less as measured by holding it horizontally for 100 hours in a moist heat environment at 80°C and 85% relative humidity (¶¶ 0011-0023; 0039).

Bopp discloses a polymer composition comprising a melt compounded product of a polyphenylene oxide and recycled polystyrene, which can be in various forms including extruded pellets, extruded foam and expandable foam beads (abstract). Articles can be formed from the product using any conventional thermoplastic forming technique including injection molding (col. 5, ll. 57-62). In an example the melt temperature near an extrusion die used to form micropellets is about 328°C, and the micropellets are imbibed with blowing agent at 95°C for 1 hour and 135°C for 4 hours (col. 8, ll. 20-43).

#### *Analysis*

The Appellants argue that Bopp's melt compounding temperature of about 328°C is for extrusion, and that one of ordinary skill in the art would not have been led by Bopp to use that extrusion melt compounding temperature for injection molding (Br. 8-9; Reply Br. 9-10). The Appellants argue that Bopp's 135°C temperature (col. 8, ll. 41-43) is for imbibing micropellets with blowing agent and that Bopp's disclosure of that imbibing temperature would not have led one of ordinary skill in the art to use that temperature as an injection molding mold temperature (Br. 9; Reply Br. 9-10).

The Examiner argues that "Bopp clearly identifies that his materials can be used in the exemplary embodiment of extrusion, but also in other

equally-known molding processes including injection molding (Column 5, lines 26-31, 57-62)” (Ans. 12). The Examiner states that “it is maintained that since Bopp gives equivalent shaping apparatuses (Column 5, lines 57-62), this shaping apparatus temperature would be applicable to all equivalent shaping apparatuses, such as an injection mold” (Ans. 13).

Bopp discloses that the melt compounded product can be used for forming articles by conventional techniques including extrusion and injection molding (col. 5, ll. 57-62). The Examiner has not provided evidence that one of ordinary skill in the art would have considered Bopp’s melt compounding temperature of about 328°C for extrusion to form micropellets to be suitable for injection molding. The Examiner’s mere speculation to that effect is not a sufficient basis for a prima facie case of obviousness. *See In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967); *In re Sporck*, 301 F.2d 686, 690 (CCPA 1962). As pointed out by the Appellants (Reply Br. 12), Rosato’s disclosures of injection molding average melt temperatures for polystyrene and polyphenylene oxide (100 and 120°C, respectively) and injection molding mold temperatures for polystyrene and polyphenylene oxide (45 and 80°C, respectively) (Table 4-8) indicate that the injection molding melt compounding temperature and mold temperature for those compounds are not necessarily within the Appellants’ ranges (melt temperature of about 330 to about 370°C and mold temperature of about 90 to about 130°C).

The Appellants argue that Bopp’s disclosure of heating micropellets to 95°C and 135°C when imbibing them with blowing agent would not have led one of ordinary skill in the art to use an injection mold temperature of about 90 to about 130°C (Br. 9; Reply Br. 9-10).

The Examiner argues that Bopp discloses a 135°C mold temperature at column 8, lines 23-44 (Ans. 4).

The 135°C temperature in that portion of Bopp is not a mold temperature but, rather, is the temperature in a reactor used to imbibe micropellets with blowing agent.

The Appellants argue that Toshihiko does not disclose injection molding, a melt temperature or a mold temperature (Br. 11; Reply Br. 12).

The Examiner argues that “[i]t would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made to use Toshihiko’s radial tilt measuring parameters during Davis’ molding method in order to insure that the radial tilt measurements are consistent with those required by customer specifications” (Ans. 4).

Toshihiko obtains the desired optical disk radial tilt change value of 0.5 or less by using a particular acrylic copolymer adhesive to join two parts of the optical disk (¶¶ 0037, 0039). The Examiner has not established that, even if one of ordinary skill in the art used Toshihiko’s test conditions to measure the radial tilt change of Davis’ data storage medium, the radial tilt change would be about 0.35° or less measured at a radius of 55 millimeters as required by the Appellants’ claim 1.

As stated in *KSR Int’l. Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007), “[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness” (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). The Examiner has not provided the required articulated reasoning with rational underpinning.



### *Conclusion of Law*

The Appellants have shown reversible error in the Examiner's determination that it would have been prima facie obvious to one of ordinary skill in the art to injection mold a disk from a polymeric material comprising poly(arylene ether) and poly(alkenyl aromatic) at a melt temperature of about 330 to about 370°C and a mold temperature of about 90 to about 130°C such that a disk assembly fabricated from the disk exhibits a radial tilt change value after 96 hours at 80°C of less than or equal to about 0.35 degree measured at a radius of 55 millimeters.<sup>3</sup>

### *Rejection of claims 18-21, 23, 24 and 27-32*

#### *Issue*

Have the Appellants shown reversible error in the Examiner's determination that it would have been prima facie obvious to one of ordinary skill in the art to injection mold a polymeric material comprising poly(arylene ether) and poly(alkenyl aromatic) to form disks according to a molding model comprising molding parameters and molding parameter values, test disk assemblies fabricated from the disks for radial tilt change, update the molding model based on molding parameter values that result in disk assemblies fabricated from the disks having a radial tilt change within a selected range of values, test the disks for percent feature replication, update the molding model based on molding parameter values that result in disks having a percent feature replication within a selected range of values, and repeat the molding, testing and updating steps until the disks exhibit a

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<sup>3</sup> The Examiner does not rely upon Adedeji, Fortuyn, Allen or Cheung for any disclosure that remedies the above-discussed deficiency in Davis, Rosato, Toshihiko. and Bopp (Ans. 9-11).

percent feature replication of greater than or equal to about 90 percent and disk assemblies fabricated from the disks have a radial tilt change value after aging of less than or equal to about 0.35 degree measured at a radius of 55 millimeters?

*Findings of Fact*

Ohkawa discloses “an actinic radiation-curable resin composition for optical molding which comprises (a) an actinic radiation-curable and cationically polymerizable organic substance and (b) an actinic radiation-sensitive initiator for cationic polymerization as essential components” (col. 1, ll. 14-19). The resin composition “is suitable for preparing a three-dimensional model by stacking laminar moldings and can be molded by CAD/CAM and docking without using any mold into a model of any complicated shape having a freely curved surface or the like with high accuracy” (col. 12, l. 67 – col. 13, l. 4).

*Analysis*

The Appellants argue that “Davis, Rosato, Toshihiko, Bopp and Ohkawa fail to teach or suggest injection molding according to a molding model comprising molding parameters, testing the resulting disks, updating the molding model, and repeating until the molding parameters of the resulting molding model results [sic] in the fabrication of disk assemblies exhibiting a radial tilt change value after aging of less than or equal to about 0.35 degree measured at a radius of 55 millimeters and a percent feature replication of greater than or equal to about 90 percent” (Br. 12; Reply Br. 14). The Appellants argue that “contrary to the Examiner’s Answer, Davis does not discuss radial tilt change, but discusses radial tilt” (Reply Br. 14).

The Examiner argues that Davis discloses an injection molded radial disk exhibiting “a radial tilt change of less than or equal to 0.35 (Para. 0031, 0057, 0058)” (Ans. 6).

Davis discloses a maximum radial tilt of preferably less than about  $0.3^{\circ}$  (¶ 0031). That is a radial tilt, not a radial tilt change. As stated by the Appellants, “[a] change in radial tilt refers to the difference between the radial tilt measurement of a newly prepared disk to the radial tilt of the disk after exposure to temporal and environmental conditions, including elevated temperature and/or humidity” (Spec. ¶ 0012).

The Examiner argues that “Toshihiko shows that it is known to carry out a method including testing disk assemblies fabricated from the disks for radial tilt change, creating an updated molding model based on the molding parameter values that resulted in disk assemblies fabricated from the disks having a radial tilt change within a selected range of values; and repeating the molding, testing, and creating steps to form final disks and a final molding model (Para 0008; It is noted that Toshihiko’s ‘repeated research’ would comprise the claimed steps.)” (Ans. 7).

The paragraph of Toshihiko relied upon by the Examiner discloses a radial tilt change value of 0.5 degree or less, but does not pertain to molding parameters. The term “repeated research” taken by the Examiner from the machine translation of record is “extensive research” in the English translation of record and refers to research to determine the adhesive composition, not molding parameters, that results in little recording medium warping and deformation (¶ 0009).

*Conclusion of Law*

The Appellants have shown reversible error in the Examiner's determination that it would have been prima facie obvious to one of ordinary skill in the art to injection mold a polymeric material comprising poly(arylene ether) and poly(alkenyl aromatic) to form disks according to a molding model comprising molding parameters and molding parameter values, test disk assemblies fabricated from the disks for radial tilt change, update the molding model based on molding parameter values that result in disk assemblies fabricated from the disks having a radial tilt change within a selected range of values, test the disks for percent feature replication, update the molding model based on molding parameter values that result in disks having a percent feature replication within a selected range of values, and repeat the molding, testing and updating steps until the disks exhibit a percent feature replication of greater than or equal to about 90 percent and disk assemblies fabricated from the disks have a radial tilt change value after aging of less than or equal to about 0.35 degree measured at a radius of 55 millimeters.<sup>4</sup>

DECISION/ORDER

The rejections under 35 U.S.C. § 103 of claims 1, 3-6, 8, and 15-17 over Davis in view of Rosato, Toshihiko, and Bopp, claims 18-21, 23, 24, 31, and 32 over Davis in view of Rosato, Toshihiko, Bopp, and Ohkawa, claims 10 and 14 over Davis in view of Rosato, Toshihiko, Bopp, and Adedeji, claim 11 over Davis in view of Rosato, Toshihiko, Bopp, and

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<sup>4</sup> The Examiner does not rely upon Singh, Fortuyn, Allen or Adedeji for any disclosure that remedies the above-discussed deficiency in Davis, Rosato, Toshihiko, Bopp, and Ohkawa (Ans. 11-12).

Fortuyn, claim 12 over Davis in view of Rosato, Toshihiko, Bopp, and Allen, claim 13 over Davis in view of Rosato, Toshihiko, Bopp, and Cheung, claim 27 over Davis in view of Rosato, Toshihiko, Bopp, Ohkawa, and Singh, claim 28 over Davis in view of Rosato, Toshihiko, Bopp, Ohkawa, and Fortuyn, claim 29 over Davis in view of Rosato, Toshihiko, Bopp, Ohkawa, and Allen, and claim 30 over Davis in view of Rosato, Toshihiko, Bopp, Ohkawa, and Adedeji are reversed.

It is ordered that the Examiner's decision is reversed.

REVERSED

PL Initial:  
sld

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